The State of Transportation Statistics

Transportation statistics are more up-to-date and extensive today than at any time in recent history, yet unprecedented and unmet demands are being placed on the use of those statistics by decisionmakers. The Bureau of Transportation Statistics (BTS) and the transportation and data communities face many challenges in meeting the emerging needs of the information age.

As documented in several reports of the National Academy of Sciences, the transportation community now requires statistics to be more complete, detailed, timely, and accurate than ever before (TRB 1992, 1997a, and 1997b). Today's transportation statistics remain incomplete, although major data-gathering efforts have occurred throughout the past decade. For example, despite intensified interest in the transportation of goods and passengers between countries, the United States does not yet collect data on the domestic movement of commodities traded internationally. Data on this and other currently unmeasured transportation activities could provide valuable insights for decisionmakers. Some transportation activities, however, may prove difficult to measure.

The demand for completeness in transportation data means that fuller information is required not just about transportation activity, but about transportation's impacts as well. It is recognized that transportation plays a central role in the economy, the environment, and many other fields, but there is great uncertainty about the range of transportation benefits and costs. Transportation can have large social

impacts on minority populations, those of various ages and income levels, and persons with disabilities. Specific details about traveler characteristics and persons affected by transportation are required, in order to investigate many social concerns.

The demand for specifics extends to geography and time, recognizing that congestion as well as other transportation problems are not general conditions, but arise from concentrating more activity in one location at the same time than the infrastructure can accommodate. The importance of geographic detail can be seen in the effects transportation has on where people and goods go and where they do not. The demand for more timely data recognizes that transportation must respond to rapidly changing conditions, especially in a global economy, and that decisions cannot wait for measurements to be devised.

Greater accuracy in transportation data will improve the credibility and thus the utility of statistics for decisionmaking. The Government Performance and Results Act of 1993,[1] which emphasizes increased accountability in government, also drives the need for accuracy. As a first step, BTS is publishing data accuracy profiles in the 1999 edition of *National Transportation Statistics.*

The basic demands placed on transportation statistics have not changed substantially over the past few years, but the need for improved response has intensified. The Transportation Research Board's *Data for Decisions* (1992) and the first BTS *Transportation Statistics Annual Report* (TSAR94) laid out a group of questions about transportation, so that the appropriate data and information might be obtained. Those questions were listed in table 8-1 of TSAR94 (pp. 179–180), and are updated in table 6-1. These questions remain important, reflect current issues, and need attention in order to determine whether the Department of Transportation's published strategic goals of enhancing safety, mobility, economic development and trade, the natural and human environment, and national security are being attained (USDOT 1997).

The success of public programs in meeting information needs may be measured in various ways, but the consensus view is perhaps best reflected by enacted legislation. Two legislative milestones of the past decade in the field of transportation were the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and the Transportation Equity Act for the 21st Century (TEA-21) of 1998. ISTEA established BTS as a new national statistical agency for transportation with a list of statistical mandates. TEA-21 reaffirmed the programs begun under ISTEA and added new topics to be tackled, including global competitiveness, relationships between highway transportation and international trade, bicycle and pedestrian travel, and an accounting of expenditures and capital stocks related to transportation infrastructure. TEA-21 provides increased resources for data initiatives to improve highway safety, and studies were mandated on topics ranging from large trucks to school transportation to ferry boats. TEA-21 also recognizes the need to organize, preserve, and disseminate a wide range of information more effectively by authorizing the National Transportation Library.

Furthermore, TEA-21 requires BTS to establish and maintain the Intermodal Transportation Database (ITDB) as a complete picture of transportation activity, measured in physical and economic terms. The ITDB when fully developed will describe the basic mobility provided by the transportation system, identify the denominator for safety rates and environmental emissions, illustrate the links between transportation activity and the economy, and provide a framework for integrating critical data on all aspects of transportation. The ITDB will also provide a framework

[1] Public Law 103-62, 107 Stat. 286 (1993).

Table 6-1
Transportation Data Needs

What data are needed on passenger and freight transportation?	How are these data useful for public policy, infrastructure planning, and market analysis?
Who travels? How much travel? What moves? How much moves?	Shows source of transportation demand and most direct beneficiaries of transportation investment.
Why do people travel? How valuable is the material being moved?	Indicates relative importance of serving the demand for transportation.
How far do people travel? How far do goods move?	Provides an aggregate measure of transportation consumed.
From where to where?	Shows location of transportation facilities and services consumed; geographic regions and corridors affected.
What is the main mode used?	Provides basic input for debates on intermodal issues.
What other modes were used?	Indicates demand for intermodal connections and local access.
Do the links, nodes, and service providers cover current and anticipated origins and destinations?	Is a basic system performance measure.
How much of the system capacity (links, nodes, vehicles, and services) are consumed by current and anticipated travel and goods movement?	Indicates physical capacity of the system to provide service for basic transportation demand.
How timely is travel and goods movement between origins and destinations? (Traveltime, system speed)	Shows how effective the system is for the user; is a major component of user satisfaction, economic productivity, and international competitiveness.
How reliable are the trips and goods movements between origins and destinations?	Shows how effective the system is for the user; is a major component of user satisfaction, economic productivity, and international competitiveness.
How much does it cost to provide transportation services and infrastructure?	Indicates the efficiency of the transportation system.
How much do shippers and travelers spend to use services and infrastructure?	Shows how efficient the system is for the user; indicates the consequences for economic productivity and international competitiveness; provides input for market analysis.
How much of the costs for services and infrastructure are covered by users, the public sector, or others?	Provides input for analyses of investment, cost allocation, and privatization issues.

(continued on following page)

Table 6-1
Transportation Data Needs ***(continued)***

What data are needed on passenger and freight transportation?	How are these data useful for public policy, infrastructure planning, and market analysis?
How likely is the traveler to be hurt or luggage lost or damaged? How likely is the shipment to be damaged, lost, or stolen?	Indicates safety and security.
Who is the service provider?	Identifies the direct beneficiaries of transportation investment; provides accountability.
What is the financial condition of the service provider?	Identifies the ability of providers to maintain and improve performance and safety, susceptibility to foreign ownership and legal complications.
If the travel is for business, what industry is being served? For goods movement, who are the shippers and receivers?	Identifies the economic sectors receiving direct benefits from transportation investments.
Who else is dependent on the travel or the shipment?	Identifies others receiving direct benefits from transportation investments.
How much damage is done to the physical infrastructure and which users are causing the damage?	Establishes investment needs; indicates where costs should be allocated among users and others.
What is the risk of health-related mishaps?	Identifies safety risks; can present special risks for hazardous materials.
What are the effects on air and water quality, noise, and other environmental concerns?	Mandated by environmental legislation; provides information for the ongoing debate between environmental concerns and interstate commerce.
How much energy is consumed?	Provides basic information on energy conservation and for national security issues and global climate change.
Who and what are affected by these externalities?	Identifies the societal and environmental consequences of transportation, in addition to how endangered species are affected.

for identifying and filling gaps in essential information. One of the biggest gaps involves the domestic transportation of international trade, described in box 6-1.

TEA-21 also requires BTS to establish and maintain the National Transportation Atlas Databases (NTAD), recognizing that transportation exists to overcome the barriers of geography. The NTAD is based on four layers of information:

- facilities (including transportation links, terminals, interchange points, staging areas, and so forth);
- services on those facilities (e.g., railroad trackage rights);

Box 6-1

Domestic Transportation of International Trade

Legislation and the Department of Transportation's strategic plan have increased the already considerable interest by the Bureau of Transportation Statistics (BTS) in the domestic transportation of international trade. The Transportation Equity Act for the 21st Century (TEA-21) directs BTS to provide information on "transportation-related variables that influence global competitiveness" and specifically to conduct a study of the use of domestic highways to move international trade. In addition, economic growth and trade, of which international trade is a major component, is one of the strategic goals of the Department.

These developments require progress in solving the longstanding problem of accurate, high-quality data in the area of international transportation and trade. One of the key issues is obtaining accurate geographic data. The transportation community is concerned with physical geography; that is, does the international shipment enter the territorial limits of the United States and the U.S. transportation system? The trade community is interested in economic geography; that is, does the international shipment enter the U.S. economy? Both transportation and trade communities want to know the states in which the exports originate and the states to which imports are destined. Because of data definitions and collection procedures used by the Census Bureau and the U.S. Customs Service, transportation-related data are not always accurately reported. As an example, some U.S. import shipments arriving from Canada by truck are reported as entering the United States at Dallas, Texas.

BTS recognizes the need to take a comprehensive, multimodal approach to collection, analysis, and dissemination of international trade data. This is because the data problem affects all forms of transportation. For example, the top three gateways between the United States and the rest of the world by value in 1997 were the Port of Long Beach, the highway and rail crossings at Detroit, and John F. Kennedy International Airport in New York. Each of these facilities handled over $80 billion in goods. Understanding the domestic links between gateways and the heartland is vital to supporting America's role in the global economy.

One notable development in the multimodal approach to international transportation and trade data was the transfer of the international waterborne statistics program on October 1, 1998 from the Census Bureau to the U.S. Department of Transportation's Maritime Administration and the U.S. Army Corps of Engineers. BTS intends to become more active in enhancing coverage and increasing the quality of the statistics by bringing together data from the Customs Service, the Census Bureau, and the federal transportation agencies, as well as from our North American partners.

BTS has been working with our North American partners to compile consistent and comparable transportation data across the three countries. For example, the Bureau established a Standard Classification of Transported Goods with the Census Bureau and Statistics Canada to describe and classify commodities in ways that are more useful to the transportation community. BTS is currently working with the transportation and statistical agencies of Canada and Mexico on a North American Transportation Statistics Project, which will include the release of a statistical publication that will provide a continental picture of transportation and reveal differences in data definitions and comparability. Annual meetings of the transportation and statistics agencies of all three countries, through the framework of the North American Transportation Statistics Interchange, promote information exchange and partnership opportunities for the resolution of common problems.

- flows over those facilities (including passenger, freight, and vehicle flows whether by the service providers or by private transportation); and
- background (including political boundaries and the surrounding distribution of people, economic activity, and environmental conditions).

The NTAD is designed to be the primary data source for national-level transportation mapping, spatial and network analysis, and the starting point and model for the transportation framework layer of the National Spatial Data Infrastructure. To meet these needs, NTAD data are compiled at a scale of 1:100,000, in which

everything is located within approximately 100 meters of its true location.

TEA-21 and the report of a National Research Council Committee on National Statistics emphasize the need to improve data quality and comparability throughout transportation (TRB 1997a). From the BTS perspective, improvements in data quality and comparability require:

- adoption of common definitions of variables;
- adherence to good statistical practice, particularly in the collection and interpretation of sample data;
- replacement of questionnaires with unobtrusive methods of data collection, perhaps through the use of administrative records and remote sensing; and
- validation of statistics used in performance measures and other applications.

Validation goes beyond determining that a statistic is accurate, reliable, and based on an unbiased set of observations and methods of estimation. The statistic must also be relevant to the concept being represented. Ideally, the statistic should also be transparent and devoid of spurious accuracy.

Many performance measures in transportation fail the relevance test, either because the measure is not readily linked to real-world experience or because the measure fails to capture the desired concept. The commonly used measure of a ton-mile in freight transportation illustrates the problem; very few decisionmakers can visualize a ton-mile or find it relevant to transportation issues. The ratio of the "transportation bill" to Gross Domestic Product as a measure of transportation's share of the economy is another example. The numerator (the sum of all expenditures made annually in the economy on transportation) and the denominator (the annual output of goods and services produced by the economy) are based on entirely different forms of accounting and should not be combined.

Improving transportation statistics may mean developing and institutionalizing new data-collection technologies. Some traditional data-collection tools, such as roadside surveys, on-board travel surveys, travel diaries, and household travel surveys, are relatively expensive and pose reliability problems, or present safety problems for the interviewers. The use of data derived from intelligent transportation systems (ITS) applications offer promise, and opportunities to utilize ITS are worth investigation. However, any new means of obtaining data is likely to require new institutional arrangements and pose new questions of statistical quality. As part of its efforts to improve the quality of statistics, BTS is working with the Federal Highway Administration to coordinate the American Travel Survey and the Nationwide Personal Transportation Survey in order to develop better estimates of mid-range travel (30 miles to 99 miles), and improve data comparability and analysis of the continuum of travel from short walking trips to international air travel.

BTS continues to work with its partners and customers to ensure that its statistics "are relevant for transportation decision-making by [the] Federal Government, State and local governments, transportation-related associations, private businesses, and consumers."[2] BTS is hosting workshops on data needs for transportation safety, and cosponsored a national conference on data needs for economic analysis. In addition, BTS will begin to analyze existing data for the congressionally mandated study of international trade carried over U.S. highways. BTS will continue to cooperate as part of the North American Interchange on Transportation Statistics and host working groups on geospatial data, maritime data, performance measures, and other topics. Through these efforts, BTS and its partners will continue to make transportation count.

[2] 49 U.S.C. 111 (c)(7).

REFERENCES

Transportation Research Board (TRB). 1992. *Data for Decisions: Requirements for National Transportation Policy Making,* Special Report 234. Washington, DC: National Academy Press.

Transportation Research Board (TRB), National Research Council. 1997a. *The Bureau of Transportation Statistics: Priorities for the Future.* Edited by C.F. Citro and J.L. Norwood. Washington, DC: National Academy Press.

_____. 1997b. *Information Needs to Support State and Local Transportation Decision Making into the 21st Century.* Washington, DC: National Academy Press.

U.S. Department of Transportation (USDOT). 1997. *Strategic Plan 1997–2002*. Washington, DC. 30 September.